

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**



INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation and Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein together with the Statement of inventorship and of right to grant of a Patent (Form 7/77), which was subsequently filed.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

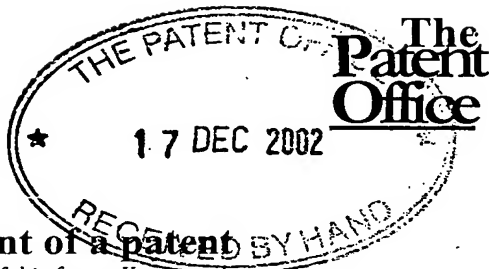
Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.



Signed *Andrew Jones*

Dated 26 November 2003

THIS PAGE BLANK (USPTO)



18DEC02 E771614-3 D02826
P01/7700 0.00-0229347.0

1/77

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1.	Your reference	BP-09-0296		
2.	Patent application number (The Patent Office will fill in this part)	0229347.0		17 DEC 2002
3.	Full name, address and postcode of the or of each applicant (underline all surnames)	MBM TECHNOLOGY LIMITED Victoria Road Portslade, Brighton EAST SUSSEX BN41 1YH Patents ADP number (if you know it) If the applicant is a corporate body, give the country/state of its incorporation		
		3962446002 UNITED KINGDOM		
4.	Title of the invention	ELECTRICAL CONNECTOR		
5.	Name of your agent (if you have one)	PHILLIPS & LEIGH 5 Pemberton Row London EC4A 3BA "Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode) Patents ADP number (if you know it)		
		0001289001		
6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority application number (if you know it)	Date of filing (day / month / year)
7.	If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application		Date of filing (day / month / year)
8.	Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if: a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body. See note (d))	Yes		

Patents Form 1/77

9. ☐ Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form -

Description 4

Claim(s) 2

Abstract 1 *DM*

Drawing(s) 2 + 2

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translation of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*) To follow

Request for preliminary examination and search (*Patents Form 9/77*) 1 ☒

Request for substantive examination (*Patents Form 10/77*) 1 ☒

Any other documents
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Phillip S. C.

Date

17th December 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

Martin Hammler 020 7822 8888

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

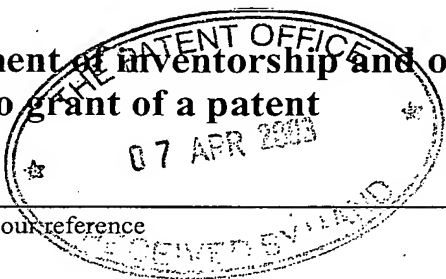
Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

Statement of inventorship and of
right to grant of a patent

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH



1.	Your reference	BP-09-0296
2.	Patent application number (if you know it)	GB 02 29347.0
3.	Full name of the or of each applicant	MBM TECHNOLOGY LIMITED
4.	Title of the invention	ELECTRICAL CONNECTOR
5.	State how the applicant(s) derived the right from the inventor(s) to be granted a patent	By virtue of employment of the inventors by the applicant and by virtue of Section 39(1).
6.	How many, if any, additional Patents Forms 7/77 are attached to this form (see note (c))	None
7.	I/We believe that the person(s) named over the page (and on any extra copies of this form) is/are the inventor(s) of the invention which the above patent application relates to.	
	Signature	Date
	<i>Martin Hammler</i>	7 th April 2003
8.	Name and daytime telephone number of person to contact in the United Kingdom	Martin Hammler 020 7822 8888

Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there are more than three inventors, please write the names and addresses of the other inventors on the back of another Patents Form 7/77 and attach it to this form.
- When an application does not declare any priority, or declares priority from an earlier UK application, you must provide enough copies of this form so that the Patent Office can send one to each inventor who is not an applicant.
- Once you have filled in the form you must remember to sign and date it.

Patents Form 7/77

Enter the full name, address and postcodes of the inventors in the boxes and underline the surnames

John EATON
c/o MBM Technology Limited
Victoria Road
Portslade
Brighton
East Sussex BN41 1YH
United Kingdom

6886022002

Patents ADP number (if you know it):

Michael James CRUTTENDEN
40 Oakdene Crescent
Mile Oak
Hove
Sussex BN41 2RP
United Kingdom

7582208001

Patents ADP number (if you know it):

Reminder

Have you signed the form?

Patents ADP number (if you know it):

DUPLICATE

1

ELECTRICAL CONNECTOR

This invention concerns electrical connectors for stores to be released or ejected from an aircraft. The electrical connector must be positively and safely disconnected to avoid damage to the electrical circuit and its anchoring points on the store and aircraft or dispensing system, as the store separates from the aircraft, often at considerable relative speed. This function is normally achieved by firmly securing a first half of the connector to the store and fitting a second half of the connector at the end of a flexible cable extending from the aircraft or dispensing system. A lanyard is secured between a fixed strong point on the aircraft or dispensing system and the connector second half, so that as the store separates from the aircraft, the lanyard is tensioned and releases a spring-loaded coupling sleeve on the connector, thereby allowing the two halves to separate. The length of the lanyard is shorter than the cable, which is therefore not subjected to excessive strain as the connector halves are pulled apart.

Whilst the store remains attached to the aircraft, the connector halves must be maintained together securely to resist premature separation by vibration and aerodynamic and inertial loads. In its rest position, the coupling sleeve keeps locking balls or dogs engaged in a co-operating groove in a retaining ring which is screwed onto the connector first half, to make up the electrical connection. The known connector therefore has a screw-on, pull-off action. Under certain conditions, for example very high separation speeds, this connector can fail to separate correctly. The aircraft side (second) connector half, including the electrical contacts, conductors and insulator blocks within it, can be damaged, requiring replacement before the store can be replenished. This is a lengthy operation, needing specialist tools and facilities.

The present invention aims to mitigate or eliminate these problems and provides an electrical connector disposed in use between a store and an aircraft or dispenser, a first half of the connector being mechanically connected to the store and a second, complementary half of the connector being connected to an electrical cable attached to the aircraft or dispenser, the connector second half comprising a core containing electrical contacts and an outer shell snap-engageable with the first connector half to securely retain the connector second half in mating engagement with the connector first half while the store is being carried by the

aircraft, the outer shell being pulled off the connector first half as the store is separated from the aircraft, the outer shell being formed as a separate component or assembly, removably attached to the connector second half core. The snap-engageable connector of the invention performs well even at high separation speeds. Furthermore, even if it fails to disconnect
5 cleanly, any resulting damage to the second half is likely to be confined to the outer shell. This is readily replaceable in the field, without disturbing the cable or its electrical connections to the core of the second connector half.

Preferably the snap-engagement is provided by a resilient finger extending axially between
10 the first and second connector halves, the finger being attached to one of the connector halves and engageable with a detent provided on the other connector half. The fingers may be attached to a ring mounted on a sleeve comprising the outer shell.

The outer shell may furthermore comprise an attachment ring rotatable about the second
15 connector half and to which ends of a lanyard are anchored.

The outer shell may be held on the connector second half core by a threaded clamping ring. It may also be provided with EMC shielding.

20 The detent may be a circumferential rib formed on a collar threadingly or otherwise connected to the connector first half.

Further preferred features and advantages of the invention may be understood from an illustrative embodiment, described below with reference to the drawings in which:

25 Figure 1 is an exploded perspective view of a connector embodying the invention;

Figure 2 is a cross-sectional view of the second half of the connector of Figure 1;

Figure 3 shows the first half of the connector of Figure 1 and co-operating parts of the second half;

Figure 4 shows the two connector halves mated together, and

30 Figure 5 is an enlarged view of part of Figure 4.

The connector comprises a first half 10 and a second half 12. The second half comprises a core 14 containing the required electrical conductors and contacts (not shown). The electrical contacts are surrounded by a barrel 16 having keys 18 for rotational alignment of the first and second connector halves 10, 12 and proper registration of the electrical contacts in them.

5 The connector second half further comprises an attachment ring 20 to which ends of a lanyard 22 are anchored, and an outer shell assembly comprising a moulded sleeve 28, an internally threaded clamping ring 30 and resilient metallic (e.g. spring steel) fingers 24 integrally formed with a mounting ring 26.

10 To assemble the second connector half, as shown in Figure 2, the attachment ring 20 is slid over the barrel up to a shoulder 38 on the core 14. The attachment ring 20 is shown with a lanyard 22 fitted. However instead this could be an alternative cable strain relief device or interface. The next component fitted over the barrel 16 is the mounting ring 26 and fingers 24, which are pre-assembled on the sleeve 28 together with an EMC shielding ring 32. This

15 assembly 24, 26, 28 is retained over the barrel 16 by the clamping ring 30, which is screwed onto external threads on the core 14. Tightening the ring 30 clamps the sleeve 28 and mounting ring 28 against a further shoulder 40 formed on the core 14. The attachment ring 20 is thereby trapped for free rotation on the core 14 between the shoulder 38 and the mounting ring 26.

20

The fingers are located in axial slots formed in the exterior of the sleeve 28. The distal ends of the fingers are formed with inwardly extending curved tips 42, received in through-going slots formed in the free end of the sleeve 28. (See Figure 3). The sleeve 28 is the main mechanical structure which provides support to the spring fingers 24 and the EMC shield 32.

25 The spring fingers provide the means to retain the two mating halves 10, 12 of the connector together using their curved tips 42, as further explained below. Although four fingers 24 are illustrated, there could be two through to eight or more, depending on the size of the connector core components to be mated. The EMC shield 32 is optional, depending on the overall requirements for the connector EMC performance. The type of braid which can be

30 fitted provides a full 360° screening/bonding performance.

The clamping ring 30 has features (e.g. slots 44, Figure 1) that allow the ring to be hand torqued into place using a suitable tool. This completes the assembly of the aircraft-side connector at the end of the flexible cable. On the standard store connector receptacle 36 forming part of the first connector half, the only item which needs to be added is a detent collar 34 which as shown is screwed onto external threads (see Figure 3). Alternatively, 5 different standard collar fittings (e.g. bayonet fittings) can be used to suit a given store connector receptacle 36.

Obviously the features of the two connector halves 10, 12 can be swapped to provide the best 10 solution for an individual application.

The connector once assembled is simple to operate as the two halves 10, 12 are mated by first aligning the keys 18 with keyways in the other connector half (where necessary) and then pushing the two halves together. As the contacts in the core 14 and store receptacle 36 15 engage, the spring fingers 24 open over a shaped rib 48 on the detent collar 34 (see Figure 5). As the electrical contacts mate fully home so the spring fingers spring back into position having moved over the rib 48. As shown, the rib 48 has a curved profile to match the profile of the finger tips 42. To disengage the connector, the second half 12 can be pulled by the attachment ring 20 which provides a tensile load on the core 14 and therefore provides the 20 force to push apart the spring fingers 42 over the rib 48.

The connector provides for easy and reliable mating and demating of the connector halves under extreme conditions. The connector system allows simple replacement of the mechanical retention mechanism whilst being in the field, without the need to remove 25 electrical contacts.

CLAIMS

1. An electrical connector disposed in use between a store and an aircraft or dispenser,
a first half of the connector being mechanically connected to the store and a second,
5 complementary half of the connector being connected to an electrical cable attached to the
aircraft or dispenser,

the connector second half comprising a core containing electrical contacts and an outer shell
snap-engageable with the first connector half to securely retain the connector second half in
mating engagement with the connector first half while the store is being carried by the
10 aircraft,

the outer shell being pulled off the connector first half as the store is separated from the
aircraft,

the outer shell being formed as a separate component or assembly, removably attached to the
connector second half core.

2. An electrical connector as defined in claim 1 in which the snap-engagement is
provided by a resilient finger extending axially between the first and second connector
halves, the finger being attached to one of the connector halves and engageable with a detent
provided on the other connector half.

3. An electrical connector as defined in claim 2 in which the finger is attached to a ring
mounted on a sleeve comprising the outer shell.

4. An electrical connector as defined in claim 2 or 3 in which the detent is a
25 circumferential rib formed on a collar connected to the connector first half.

5. An electrical connector as defined in any preceding claim in which the outer shell
comprises an attachment ring rotatable about the second connector half and to which ends of
a lanyard are anchored.

6. An electrical connector as defined in any preceding claim in which the outer shell is
held on the connector second half core by a threaded clamping ring.

7. An electrical connector as defined in any preceding claim in which the outer shell is provided with EMC shielding.
- 5 8. An electrical connector disposed in use between a store and an aircraft or dispenser, substantially as described with reference to or as shown in the drawings.

Abstract

[Fig. 1]

ELECTRICAL CONNECTOR

5

10

An electrical connector disposed in use between a store and an aircraft or dispenser comprises a first half 10 mechanically connected to the store and a second, complementary half 12 connected to an electrical cable attached to the aircraft or dispenser, the connector second half 12 comprising a core 14 containing electrical contacts and an outer shell 24, 26, 28, 30 snap-engageable with the first connector half to securely retain the connector second half in mating engagement with the connector first half while the store is being carried by the aircraft, the outer shell being pulled off the connector first half as the store is separated from the aircraft, the outer shell being formed as a separate component or assembly, removably attached to the connector second half core.



THIS PAGE BLANK (USPTO)

Fig. 1

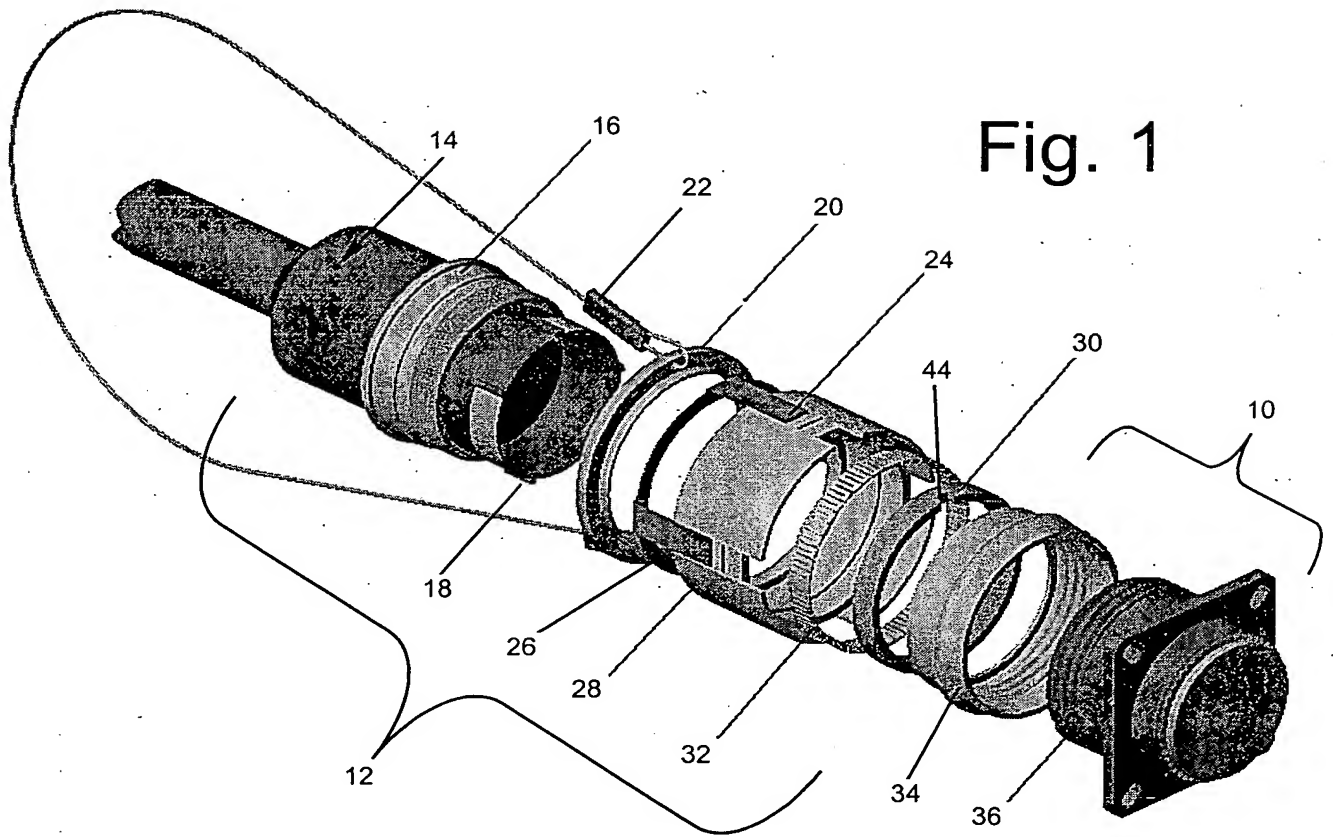
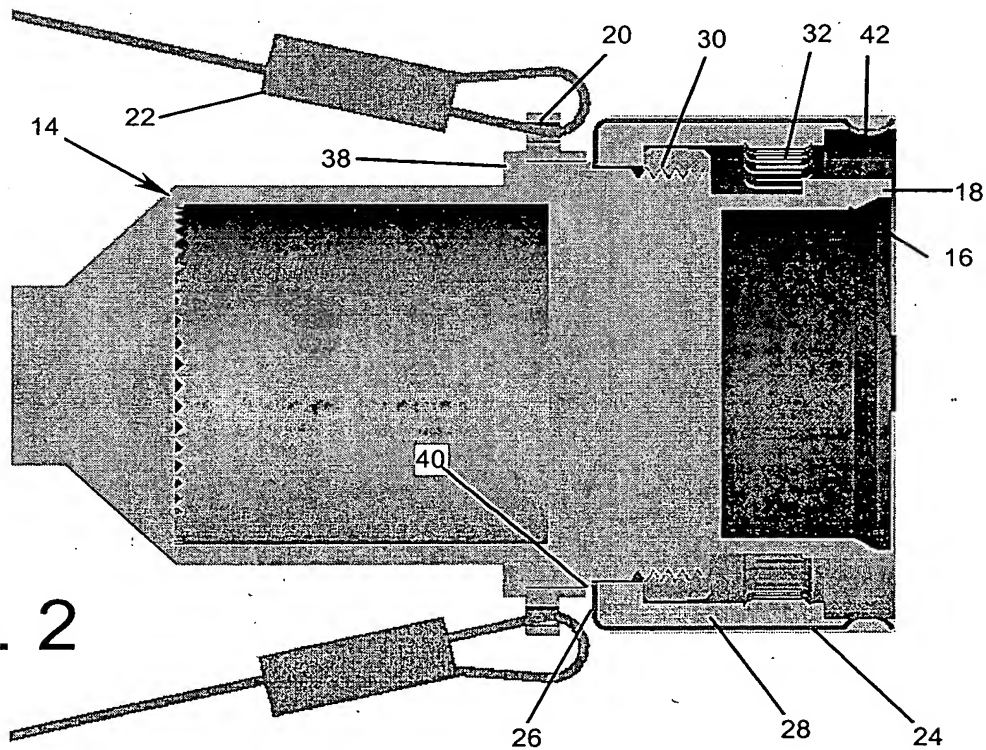


Fig. 2



THIS PAGE BLANK (USPTO)

Fig. 3

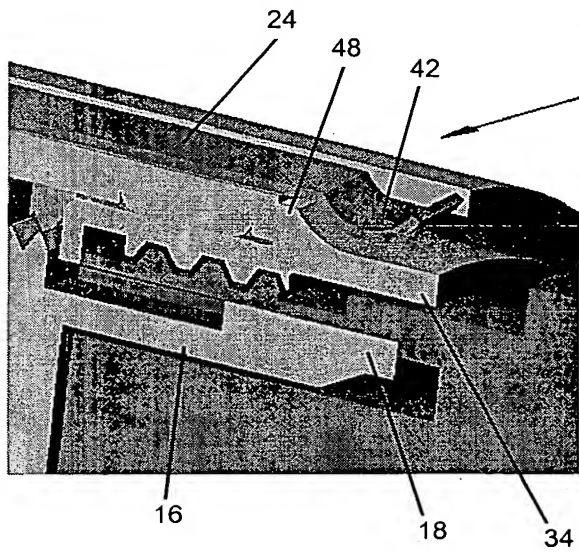
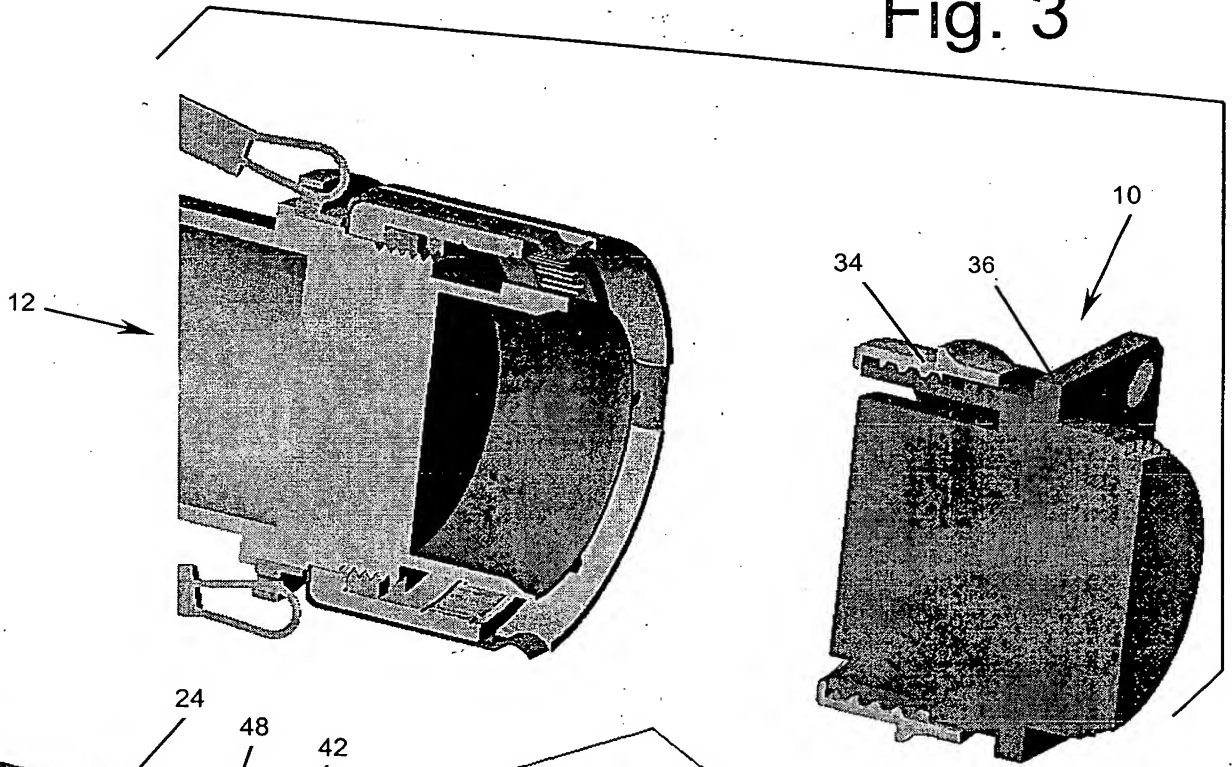


Fig. 5

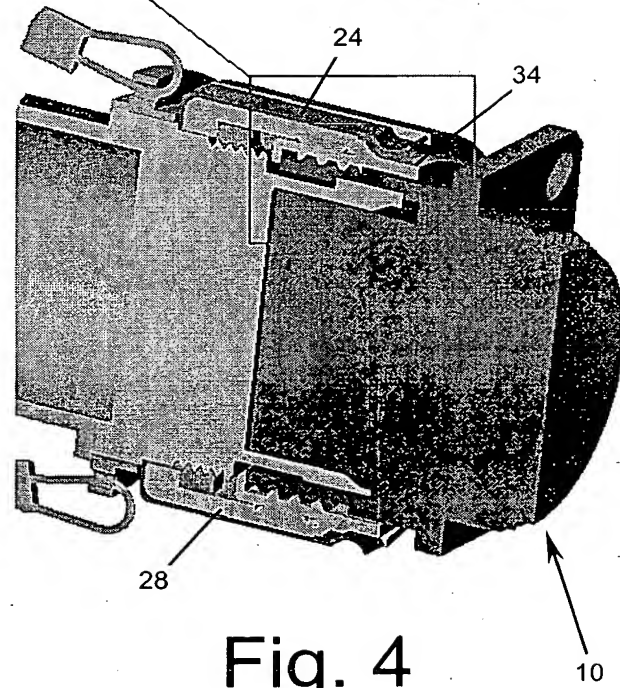


Fig. 4

THIS PAGE BLANK (USPTO)